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FEDERAL-STATE COOPERATIVE
SNOW SURVEYS and WATER SUPPLY FORECASTS
for

# ARIZONA

UNITED STATES DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE

Data included in this report were obtained by the agency named above in cooperation with the Federal, State and local organizations listed on the last page of this report.

MAR.1, 1957

# UNITED STATES DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

TO RECIPIENTS OF COOPERATIVE SNOW SURVEY AND WATER SUPPLY FORECAST REPORTS:

Snow surveys in the west are conducted each year at more than 1200 snow courses. Basin and Province or State snow survey reports summarizing the results of the measurements and forecasts of seasonal runoff and water supply are issued by the Soil Conservation Service, U. S. Department of Agriculture and some of its coperators; the Water Rights Branch of the British Columbia Department of Lands and Forests; and the California Division of Water Resources.

Copies of the various federal-state cooperative snow survey reports listed below may be secured by writing to:

Head, Water Supply Forecasting Section Soil Conservation Service 209 S. W. 5th Avenue Portland 4, Oregon

#### BASIN REPORTS:

	Issued monthly February through May by SCS and Colorado Experiment Station, Fort Collins, Colorado.*
Columbia River Basin	Issued monthly January through May by Soil Conservation Service, Boise, Idaho.*
	Issued monthly February through May by SCS and Montana Agricultural Experiment Station, Bozeman Montana.*

#### West-Wide Water........... Issued April 1 by Soil Conservation Service and Co-Supply Outlook operators, Portland, Oregon.

#### STATE REPORTS:

Arizona	Issued semi-monthly January 15 through April 1 by SCS and Salt River Valley Water Users Association, Phoenix, Arizona.*
Nevada	Issued monthly February through April by SCS and Nevada State Engineer, Reno, Nevada.*
Oregon	Issued monthly January through May by SCS, Portland, Oregon, and Oregon Agricultural Experiment Station.*
Utah	Issued monthly January through May by SCS, Salt Lake City, Utah, and State Engineer of Utah and Utah Agricultural Experiment Station.*
Washington	Issued monthly February through May by SCS, Spokane, Washington, and State Department of Conservation and Development.*
Wyoming	Issued monthly February through May by SCS, Casper, Wyoming, and State Engineer of Wyoming.*

\*Special reports are issued as needed.

The British Columbia reports are issued February 1 through June 1 and may be secured from Comptroller, Water Rights Branch, Department of Lands and Forests, Parliament Building, Victoria, B. C.

The California reports are issued monthly February 1 through May 1 and may be secured from Division of Water Resources, California Department of Public Works, Sacremento, California.

The annual water supply forecasts of the Weather Bureau are available in monthly bulletins published from January through May. These bulletins entitled, "Water Supply Forecasts for the Western United States" may be obtained from River Forecast Center, Weather Bureau, 712 Federal Office Building, Kansas City 6, Missouri.

### COOPERATIVE SNOW SURVEYS AND WATER SUPPLY FORECASTS

for

#### ARIZONA

(Salt, Verde, Gila and part of Lower Colorado River Basin)

Issued

March 1, 1957

Report Prepared

by

George Watt, Snow Survey Supervisor Soil Conservation Service 39 North Sixth Avenue Phoenix, Arizona

Issued by

Salt River Valley Water Users Association

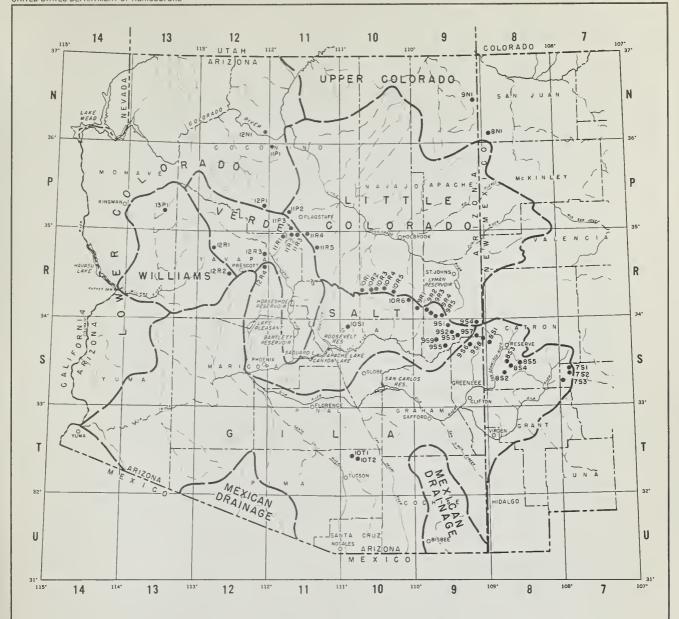
and

Soil Conservation Service

Robert V. Boyle State Conservationist

Victor I. Corbell President Soil Conservation Service Salt River Valley Water Users! Assn.





#### LEGEND

DRAINAGE BASIN BOUNDARY

13U2 • SNOW COURSE

# ARIZONA COOPERATIVE SNOW SURVEYS

SNOW COURSES AND DRAINAGE BASINS
JANUARY 1956



NUMBER	* NAME	SEC	TWP	RGE**	ELEVATION	RIVER BASIN
11-P-3	Antelope Park	29	19N	8E	7300	Verde # Discontinued
9-5 -1	Baldy (p)	28	7N	27E	9000	Salt-Little Colorado
10-T -1	Bear Wallow	6	125	16E	8100	Gila
9 <b>-</b> S -6	Beaver Head	13	4N	30E	8000	Salt-Frisco
9-5-3	Big Lake Knoll	2	5N	28 E	8800	Salt-Frisco-Little Colorado Discontinued
7-S -3	Black Canyon	8	135	11W***	6790	Gila
12-N-1	Bright Angel	34	33N	3E	8400	Lower Colorado
12-R -1	Camp Wood	3	16N	6W	5700	Williams-Verde
10-R -3	Canyon Creek (s)	18	11N	15E	7500	Salt Verde
11-R -2	Casner Park (s)	19	18N	8E	6950	verde
12-P-1	Chalender (s)	27	22N	3E	7100	Verde
8-5-3	Corner Mountain	7	105	17W***	8850	Gila-Frisco
9-5 -9	Corn Creek (p) Lat	.33°45	N. Long	3.109 <sup>0</sup> 45'W	/.§ 7730	Salt
9-S-7	Coronado Trail	26	5N	30E	8000	Salt-Frisco
10-R -2	Elk	31	11N	1 4E	7600	Salt-Little Colorado Discontinued
10-R -6	Forest Dale (s)	2	9N	21E	6000	Salt-Little Colorado
					70.50	#
11-P-2	Fort Valley	22	22N	6E	7350	Verde #
9-R -5	Ft. Apache	18	7N	27E	9160	Salt-Little Colorado
8 <b>-</b> S -1	Frisco Divide	31	65	20W***	8000	Frisco-Gila
12-R-4	Gaddes Canyon	11	15N	2E	7600	Verde #
10 <b>-</b> R -5	Gentry	36	11 N	15E	7600	Salt-Little Colorado
11-P-1	Grand Canyon	21	30 N	4E	7500	Lower Colorado
11-R -5	Happy Jack	30	17N	9E	7630	Verde
10-R -4	Heber (p)	28	11N	15E	7600	Salt-Little Colorado
7-S -2	Inman	6	115	10W***	. 7800	Gila
12-R <b>-</b> 2	Iron Springs	22	14N	3W	6200	Williams-Verde
9 <b>-</b> S -2	Maverick Fork (s)(p	113	6N	27E	9050	Sait-Little Colorado
9-R-4	McKay Peak	13	7N	24E	8250	Salt Not read
9-R-2	McNary (s)	14	8N	23E	7200	Salt-Little Colorado
9-R-1	Milk Ranch	28	8N	23E	7000	Salt
12-R-3	Mingus Mountain	3	15N	2E	7100	Verde #
, •		_				
8-5-2	Mogollon	2	115	19W***	7000	Frisco-Gila
11-R-4	Mormon Lake	13	18N	8E	7350	Verde #
11-R-3	Mormon Mountain(s		18N	8E	7500	Verde
11-R-1	Munds Park (s)	7	18N	7E	6500	Verde
8-5-4	N-Bar Lake	16	105	17W***	8600	Gila
8-S <b>-</b> 5	Negrito	6	105	16W***	8200	Gila
9-5-4	Nutrioso	23	6N	30E	8500	Salt-Frisco-Little Colorado
9-5 -5				verick, Ari		Salt
9-N-1	Roof Butte	15	8N	6W****	8500	Little Colorado # Not read
10-T -2	Rose Canyon	15	125	16E	7300	Gila
0_5_0	Shato Line	4	45	21W***	8000	Gila-Frisco
9 <b>-</b> 5 -8	State Line	6 20	6S 10S	10W***	7850	Gila
7-S -1 9-R -3	Taylor Creek Trout Creek	5	7N	24E	6400	Salt Not read
9-K -3 8-N-1	Washington Pass La					Little Colorado Not read
13~P -1	Willow Ranch	16	21N	11W	5000	Williams
10-R-1	Woods Canyon	15	11N	13E	7640	Salt-Little Colorado Discontinued
10-5-1	Workman Creek	33	6N	1 4E	6900	Salt

<sup>\*</sup> Number indicates location of course within coordinate rectangle, thus 9-N 1 is Course #1 in coordinate rectangle 9-N.

<sup>\*\*</sup> All in Gila and Salt River Base and Meridian except where otherwise indicated.

<sup>\*\*\*</sup> New Mexico Principal Meridian.

<sup>\*\*\*\*</sup> Navajo Base.
On adjacent drainage.

<sup>(</sup>s) Soil Moisture Station installed on or in vicinity of course.

<sup>§</sup> Unsurveyed.
(p) Storage gage installed on or in vicinity of course

#### ARIZONA WATER SUPPLY OUTLOOK

### March 1, 1957

- SNOW COVER: The snow courses above 9,000 feet in the White Mountains and on the North Rim of the Grand Canyon and the Mormon Mountain snow course south of Flagstaff were the only courses showing measurable snow. Around Mormon Mountain snow remains only on the shady north slopes. On the North Rim of the Grand Canyon is the deepest snow pack, being 31 inches. No courses on the Upper Gila drainage reported any snow. The three courses on the White Mountains reporting snow are 65 percent of average for this date.
- SOIL MOISTURE: Soil moisture units show the soil to be generally at field capacity but not saturated. The surface soil gave the general appearance of saturation with standing puddles of water in much of the area in the Verde River drainage around the Mogollon Rim.
- RESERVOIRED WATER: The warm February weather has improved the water storage. The Salt River system is now about 79 percent of a 15-year average for this time of year. The San Carlos Reservoir is still very low, being only  $5\frac{1}{2}$  percent of average. Lake Pleasant is still staying close to average capacity.
- especially on the Verde and Tonto Rivers. The warm February weather has caused the big runoff from the snow pack to occur in February rather than March. This has resulted in a high percent of runoff for the snow pack but has left the potential for the remaining spring runoff very low. As a result, the forecasted March-May runoff for the Salt River system is only 29 percent of a 15-year average for the three months. The Upper Gila and Frisco Rivers have been low all year and had very little snow or precipitation on their drainages. As a result, the forecast is for only an 18 percent of average flow for these two rivers. The prospects for runoff in the Little Colorado River above Lyman reservoir are also poor, there being little potential runoff from snow in the drainage.



## STREAM FLOW FORECASTS - MARCH 1, 1957

The following summarized runoff forecasts are based principally on mountain snow cover and on the assumption that precipitation and temperature during the forecast period will be near average. Appreciable deviations from normal of temperature and/or precipitation during the forecast period will correspondingly modify these forecasts.

	SEASONAL	STREAM FI		THOUSAND		
BASIN, STREAM AND STATION	Forecast Runoff 1957	Percent 15-Year Average		1955	1954	15-Year Average 1938-52
Salt River at Intake	80.0	28	105.4	36.5	214.1	290.4
Tonto River above Roosevelt	7.5	22	4.5	2.6	29.5	34.0
Verde River above Horseshoe	60.0	34	31.1	41.5	163.9	179.8
Gila River at Virden	7.5	16	6.0	6.7	20.7	46.5
Frisco River at Clifton	8.0	19	6.7	6.6	27.9	42.2
Little Colorado River above Lyman Dam 1/2/	1.5	17	nja 466 ma	0.6	1.7	9.1

<sup>1/</sup> Average is for less than 15 years of record in the 1938-52 period.

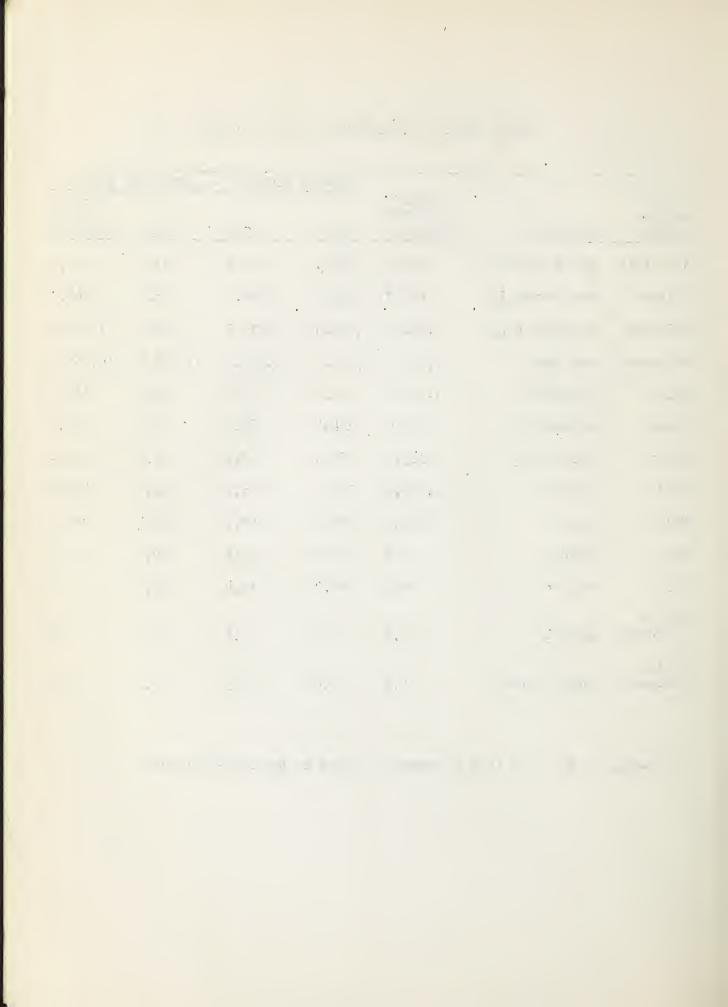
<sup>2/</sup> Forecast period for Little Colorado River above Lyman Dam is for Feb. = June, inclusive.



STATUS OF RESERVOIR STORAGE - MARCH 1, 1957

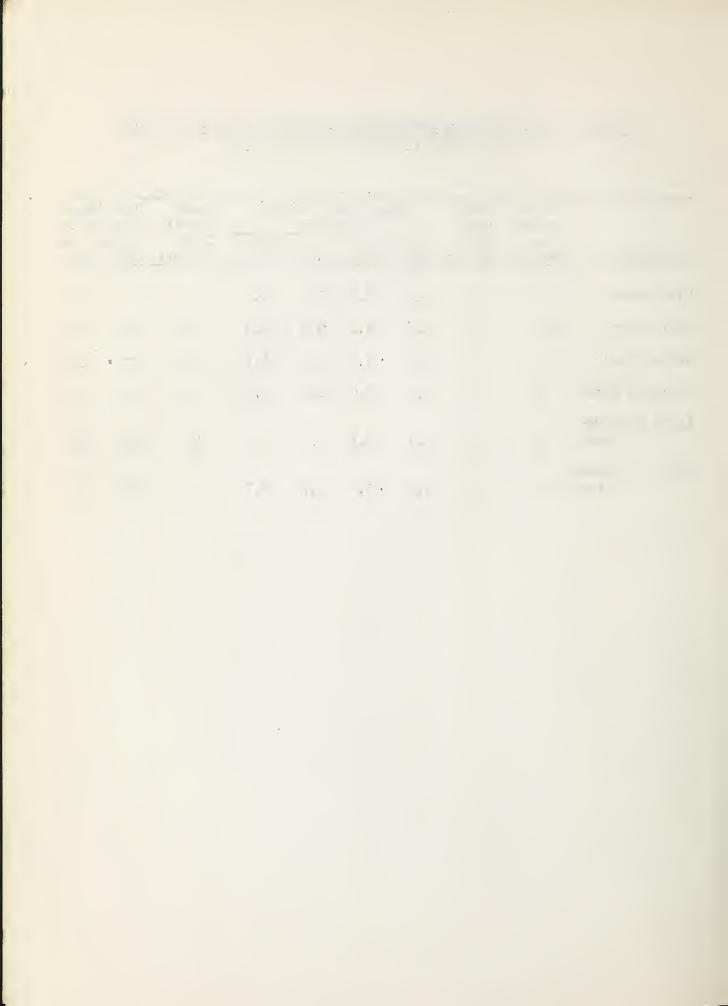
		,	USABLE	STORAGE	- 1000 ACRE	FEET
BASIN and/or STREAM	RESERVOIR	USABLE CAPACITY 1000s AF	1957	1956	1955	15-Year Average 1938-52
Agua Fria	Lake Pleasant 1/	163.8	24.4	27.8	23.1	24.3
Colorado	Lake Havasu 1/	688.0	606.4	592.1	616.3	568,0
Colorado	Lake Mohave 1/	1,810.0	1,685.4	1,710.3	1,709.7	1,107,0
Colorado	Lake Mead	27,207.0	11,700.0	11,038.0	11,869.0	18,855,0
Gila	San Carlos	1,205.0	10.2	76.0	34.9	183.3
Verde	Bartlett 1/	180.0	154.8	85.2	65.0	57.3
Verde	Horseshoe 1/	143.0	55.4	2.2	1.8	18.9
Salt	Roosevelt	1,381.6	163.1	236.2	464.3	427.8
Salt	Apache	245.1	109.0	242.5	240.4	188.1
Salt	Canyon	57.8	55.8	54.6	54.3	37.6
Salt	Saguaro	69.8	60.0	65.4	55.2	28.5
Little Colorado	Lyman <u>1</u> /	30.6	0.2	7.6	1.9	8.4
Little Colorado	Show Low Lake	5.1	0.6	0.3	0.2	

<sup>1/</sup> Average is for less than 15 years of record in the 1938-52 period.



# SUMMARY OF MARCH 1, 1957 SNOW SURVEYS AND COMPARISON OF DATA WITH THAT OF PREVIOUS YEARS BY WATERSHEDS

	No. of Courses	Snow Depth	Sn		er Con	Snow Density	1957 Water Content in		
WATERSHEDS	in Average	1957 Inches	1957	1956	1955	1938-52 Average	1957 Percent	Perce 1956	ent of Avg.
Gila River	7	0	0.0	2.5	1.4	1.9		as et es	en vo est
Salt River	14	3	1.1	4.1	3-3	3.3	37	27	33
Verde River	10	1	0.4	1.5	4.0	3.5	40	27 *	11
Williams River	2	0	0.0	0.0	0.0	1.1	an on an	***	
Lower Colorado River	4	8	3.3	2.5	5 <b>.5</b>	5.0	41	132	66
Little Colorado River		3	1.0	3.6	4.2	3.7	33	28	27



				SNO	OW COVER	MEASIII	TIMENT	S	and the state of t
			-	1957	00 VI	12:100.	-	AST RECO	RD
DRAINAGE BASIN			Date	Snow	Water	Water			Frevious
and			of		Content			1938-52	Yrs. of
SNOW COURSE	No.	Elev.	Survey	(In.)	(In.)	1956	1955	Average	Record
GILA RIVER Nutrioso Bear Wallow 2/3/ Frisco Divide State Line Coronado Trail Beaver Head Taylor Creek 2/ Inman 2/ Rose Canyon 2/3/ Mogollon 2/3/	954 10T1 851 958 957 956 751 752 10T2 852	8500 8100 8000 8000 8000 8000 7850 7800 7300	2/28 2/28 2/28 2/28 2/28 2/28 2/28 2/28	0 0 0 0 0 0 0 0 0 0 0 0	0.0 0.0 0.0 0.0 0.0 0.0 0.0	2.4 3.6 3.7 2.9 3.1 0.0 0.0	1.6 5.4 1.7 2.4 3.1 2.7 0.0 0.9 0.0	2.2 2.3 2.0 2.8 3.5 3.4 0.5 0.7	19 9 19 19 19 19 15 11
Black Canyon 2/3/	783	6790	2/28	0	0.0	0.0	0.0	GH4 500 HAS	Ţţ
SALT RIVER Ft. Apache 1/2/ Baldy 1/2/ Maverick Fork 2/ Nutrioso 1/ Coronado Trail Beaver Head Pacheta 2/ Gentry 2/ Heber 2/ Canyon Creek 2/ McNary 1/2/ Wilk Ranch 2/ Workman Creek 2/ Forest Dale 2/	9R5 9S1 9S2 9S4 9S7 9S6 9S5 1OR5 1OR3 9R2 9R1 1OS1 1OR6	9160 9125 9020 8500 8000 7600 7600 7500 7200 7000 6900 6430	2/28 2/28 2/28 2/28 2/28 2/28 2/27 2/27	15 9 18 0 0 0 0 0 0 0 0	5.0 3.6 7.4 0.0 0.0 0.0 0.0 0.0 0.0	8.7 6.1 9.7 2.9 3.1 3.3 3.6 9.3 1.9 3.4 0.8	4.8 7.0 1.6 3.7 3.5 3.2 4.5 6 9 3.1 9 3.1 9	6.7 7.0 10.9 2.2 3.5 3.4 3.0 1.0 1.3 1.6 2.9 0.9 0.0	7 7 7 19 19 19 7 7 7 7 18 16 5
VERDE RIVER Happy Jack 2/ Gaddes Canyon 2/ Mormon Mountain2/ Mormon Lake 1/2/ Fort Valley 1/2/ Mingus Mountain 2/ Chalender 2/ Casner Park 2/ Munds Park 2/ Iron Springs 1/2/ Camp Wood 2/	11R5 12R4 11R3 11R4 11P2 12R3 12P1 11R2 11R1 12R2 12R1	7630 7600 7500 7350 7350 7100 7100 6930 6500 6200 5700	2/28 2/26 2/26 2/28 2/28 2/28 2/28 2/26 2/26	068 T 0 0 0 T 0 0 0	0.0 2.6 3.7 T 0.0 0.0 0.0 T 0.0 0.0	3.7 3.1 4.6 2.7 1.0 0.0 0.6 2.1 0.0 0.0	6.3 5.2 7.8 7.0 4.0 0.0 4.9 5.9 4.2 0.0	4.2 6.0 7.0 3.2 1.9 3.7 4.4 1.1 2.0	6 3 7 10 10 10 10 6 7

<sup>1/</sup>On adjacent drainage.

<sup>2/</sup> All averages are for less than 15 years of record in the 1938-52 period.

<sup>3/</sup> Not included in watershed average.



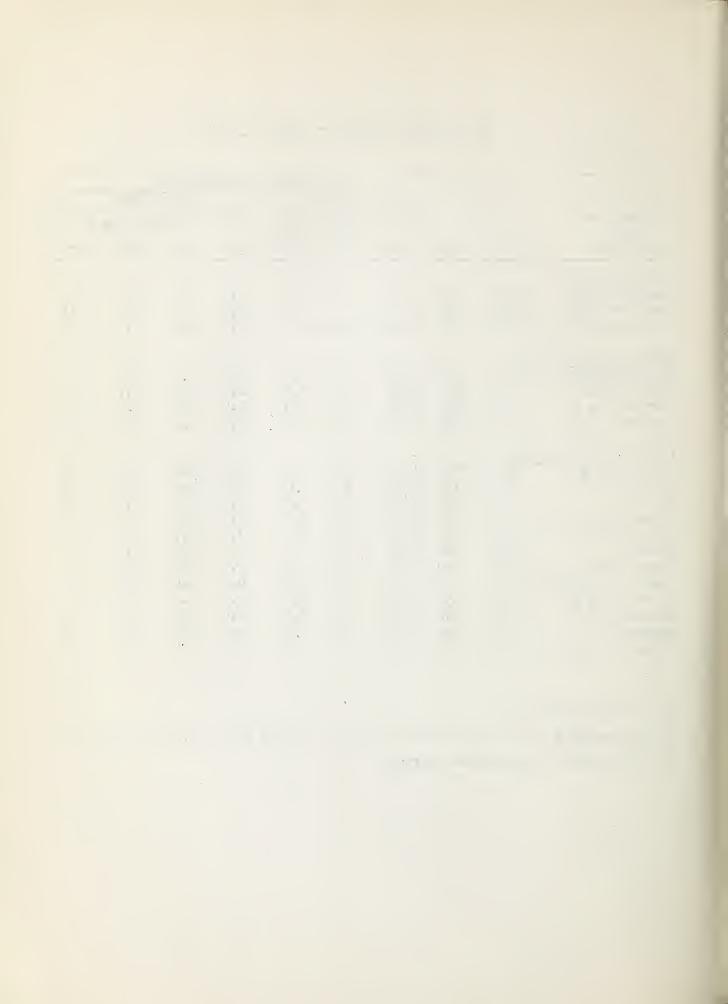
## ARIZONA SNOW SURVEYS - MARCH 1, 1957

				SMO	W COVER	MEASIII	REMENT	S	
				1957	Att. OO ATT	1111100		RECORD	
DRAINAGE BASIN			Date	Snow	Water	Water			Previous
and			of	Depth	Content			1938-52	Yrs. of
SNOW COURSE	No.	Elev.	Survey	(In.)	(In.)	1956	1955	Average	Record
WILLIAMS RIVER									
Iron Springs 2/	12R2	6200	2/25	0	0.0	0.0	0.0	2.0	11
Camp Wood 1/27	12R1	5 <b>7</b> 00	3/1	ŏ	0.0	0.0	0.0	1.2	ii
Willow Ranch 2/3/	13P1	5000	Report	Delay	ed	0.0	0.0	0.3	11
TOTED GOT ON (DO DET	E 80								
LOWER COLORADO RIV.	12N1	91.00	0/00	27	70.1	2 7	0 0	20 6	30
Bright Angel 2/ Grand Canyon 2/	12N1 11P1	8400 <b>7</b> 500	2/28 2/28	31	0.0	7.1 1.2	8.8 4.4	10.6	10 10
Fort Valley 2	11P2	7350	2/28	0	0.0	1.0	4.0	3.2	10
Chalender 1/2/	12P1	7100	2/28	Ö	0.0	0.6	4.9	3.7	10
			·						
LITTLE COLORADO RI		(-	0/00			0.5		( 5	_
Ft. Apache 2/	9R5	9160	2/28	15	5.0	8.7	4.8	6.7	7
Baldy 2/ Nutrioso	981 984	9125 8500	2/28 2/28	9	3.6	6.1 2.4	4.8	7.0 2.2	7
Happy Jack 1/2/	11R5	7630	2/28	0	0.0	3.7	6.3	4.2	19 6
Gentry 2/	10R5	7600	2/27	0	0.0	3.3	3.1	1.0	7
Heber 2/	10R4	7600	2/27	Ť	T	3.1	3.2	1.3	7
Canyon Creek 2/	10R3	7500	2/27	T	${f T}$	3.3	4.5	1.6	7 7
Mormon Mountain 2/		7500	2/26	8	3.7	4.6	7.8	6.0	7
Mormon Lake 2/	11R4	7350	2/26	T	T	2.7	7.0	7.0	10
Fort Valley 2	11P2	7350	2/28	0	0.0	1.0	4.0	3.2	10
McNary 2/	9R2 10R6	7200	2/28 2/28	0	0.0	3.6 0.8	2.6 0.8	2.9	18 18
Forest Dale 2/	TOVO	6430	2/20	0	0.0	0.0	0.0	1.3	10

<sup>1/</sup>On adjacent drainage.

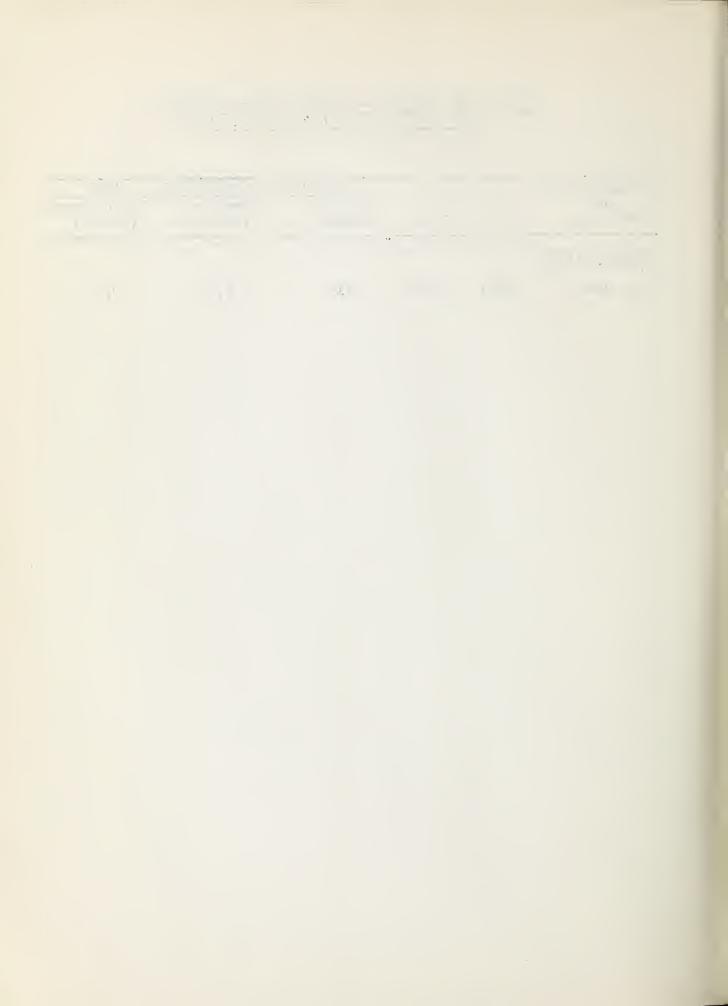
<sup>2/</sup> All averages are for less than 15 years of record in the 1938-52 period.

<sup>3/</sup> Not included in watershed average.



# ARIZONA SNOW SURVEYS - DELAYED REPORTS RECEIVED SINCE LAST BULLETIN (FEBRUARY 15, 1957)

DRAINAGE BASIN and SNOW COURSE	No.	Elev.	SNOW COV Date of Survey	ER MUASUREMENTS Snow Depth (Inches)	- 1957 Water Content (Inches)
WILLIAMS RIVER			1		
Camp Wood	12R1	5700	2/15	0.0	0.0



# LIST OF SNOW SURVEYORS

SNOW COURSE	SURVEYOR
Baldy	SCS and SRVWUA
Bear Wallow	A. F. Rea and J. R. Brinkley
Beaver Head	N. A. Josh
Black Canyon	Wayne Black
Bright Angel	Dee Bridges and George Epple
Camp Wood	Mrs. C. C. Merritt
Canyon Creek	SCS and SRV//UA
Casner Park	SCS and SRVWUA
Chalender	M. C. Oleson and T. A. Roll
Coronado Trail	J. D. McAdams
Forest Dale	R. E. Robinson, A. Valverde & R. Endfield
Frisco Divide	K. R. Weissenborn
Ft. Apache	SCS and SRVWUA
Fort Valley	Rocky Mt. Forest & Range Exp. Station
Gaddes Canyon	Richard Enz
Gentry	SCS and SRVWUA
Grand Canyon	J. Lynch
Happy Jack	Emil Ryberg
Heber	SCS and SRVWUA
Inman	C. H. McCauley
Iron Springs	Ernest Saxby
McNary	R. E. Robinson, A. Valverde & R. Endfield
Maverick Fork	SCS and SRVWUA
Milk Ranch	R. E. Robinson, A. Valverde & R. Endfield
Mingus Mountain	Richard Enz
Mogollon	J. R. Wray
Mormon Lake	SCS and SRVWUA
Mormon Mountain	SCS and SRVWUA
Munds Park	SCS and SRVWUA
Nutrioso	J. D. McAdams
Pacheta	Foch Phillips
Rose Canyon	A. F. Rea and J. R. Brinkley
State Line	K. R. Weissenborn
Taylor Creek	C. H. McCauley
Willow Ranch	Tiny Miller
Workman Creek	Rocky Mt. Forest & Range Exp. Station



The following organizations cooperate in the Arizona snow survey work:

### FEDERAL

Department of Agriculture
Soil Conservation Service

Forest Service
Apache Forest
Coconino Forest
Coronado Forest
Gila Forest
Kaibab Forest
Prescott Forest
Rocky Mountain Forest and Range Experiment Station

Department of Commerce Weather Bureau Arizona Section

Department of Interior

Bureau of Reclamation Region III

Geological Survey
Arizona District

Bureau of Indian Affairs Fort Apache Reservation

National Park Service Grand Canyon National Park

Gila Water Commissioner Safford, Arizona

### IRRIGATION PROJECTS:

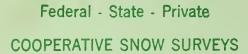
Salt River Valley Water Users' Association Phoenix, Arizona

San Carlos Irrigation and Drainage District Coolidge, Arizona

SOUTHWEST LUMBER MILLS, INC., McNary, Arizona

Other organizations and individuals furnish valuable information for the snow survey reports. Their cooperation is gratefully acknowledged.





Furnishes the basic data necessary for forecasting water supply for irrigation, domestic and municipal water supply, hydro-electric power generation, navigation, mining and industry

"WATER IS THE WEST'S GREATEST RESOURCE"